Teacher-Initiated Discourse Moves in Reformed Undergraduate STEM Learning Environments

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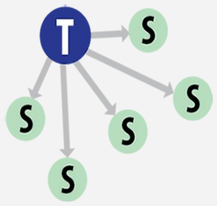
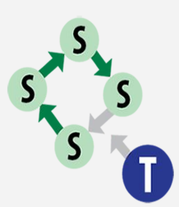
Introduction

Active learning has been shown to increase student grades and decrease failure rates in Science, Technology, Engineering, and Mathematics (STEM) classrooms.[1] In such classrooms, there is an increase in student-instructor interactions, which could lead to more productive discourse.[1] The specific conversational strategies that instructors use to foster development and understanding of content knowledge are called Teacher-Initiated Discourse Moves (TDMs).

How do students best learn?

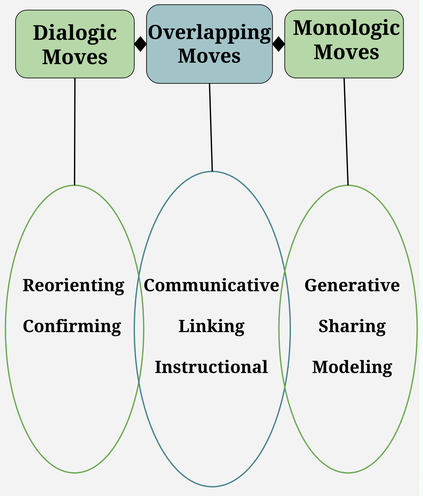


Traditional Instruction



Active Learning Instruction

Previous TDM Research



Undergraduate Chemistry Course[2]

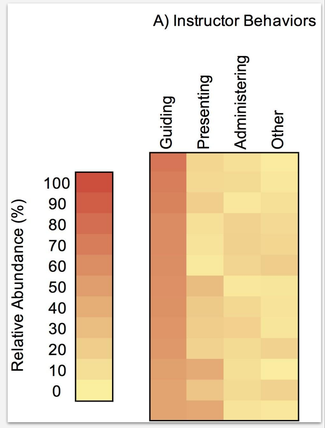
K-12 Mathematics Course

Purpose of Research:

- Characterize the nature of TDMs in undergraduate STEM active learning classrooms
- Develop a classroom discourse observation protocol (CDOP) to quantify TDMs in these STEM classrooms

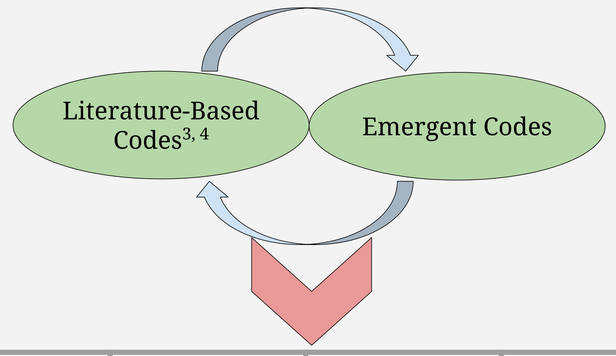
Methods

- Video-recorded 13 instructors in undergraduate biology classrooms
- Selected and transcribed the top 6 instructors based on highest percent COPUS guiding (see heat map on the right)
- A combination of literature-based and emergent codes were established based on transcripts
- Validated all 20 codes using the transcripts from 31 recorded class sessions
- Calculated Jaccard's score to identify agreement within a code
- Calculated average Jaccard's score to determine overall agreement among coders



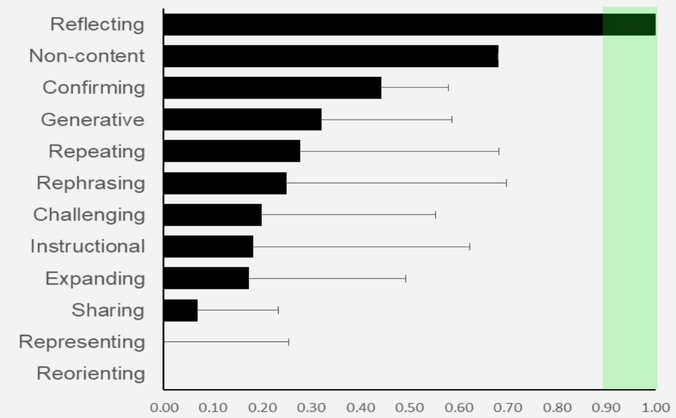
Heat map showing average percent relative abundance of COPUS codes across instructors[3]

Developing TDM Codes



Challenging	Explaining	Non-Content	Rephrasing
Communicative	Forecasting	Reflecting	Representing
Confirming	Generative	Real-Worlding	Requesting
Connecting	Instructional	Reorienting	Sharing
Contextualizing	Linking	Repeating	Synthesizing

Inter-coder Consistency



Jaccard's Score is a measure of the similarity of individual codes between coders. A score of 0 shows complete dissimilarity, while a score of 1.0 indicates complete similarity between coders.

Conclusions/Implications

The overall goal of this study is to understand and improve the best teaching practices currently used in STEM classrooms. At this point in the study, we established 20 codes to measure TDMs. An average Jaccard's score of 0.328 was found among coders, indicating low similarity between coders. However, establishing a code is an iterative process. The codes used are modified, combined, and/or collapsed as transcripts are analyzed. The coding process continues until high similarity (an average Jaccard's score of 0.9 or above) among coders is achieved . A CDOP will then be developed for TDM evaluation in STEM classrooms. This will be done by ranking the use of TDMs. An educational plan will then be implemented to improve student learning through the use of effective discourse methods.

References

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